

APPENDIX D

INTERNATIONAL GOODS MOVEMENT

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The December 2005 *Draft Emission Reduction Plan for Ports and International Goods Movement in California* focused on emissions from all port-related operations and the transport of imported and exported goods in California. Since the scope of the plan was increased to include transport of domestic goods as well, all of the emissions and health statistics in the body of this revised plan cover the larger universe of sources. We have included this appendix to allow comparison to the December draft plan by identifying the emissions, benefits of plan strategies, and 2005 health impacts from the same universe of ports and international goods movement sources. Changes between the plan version for this group of sources are due to emission inventory improvements and minor changes to the emission reduction strategies.

1. Statewide Emissions

The international goods movement category includes all emissions from on-port sources, including all vessels and harbor craft, cargo handling equipment, and on-port trucks and rail. ARB staff also assigned a portion of emissions from off-port truck and rail sources to the “international goods movement” inventory. The Technical Supplement on Emission Inventory describes the methodology used to apportion emissions in detail.

The statewide emissions from ports and *international* goods movement in California are over 400 tons per day, combined, of the four pollutants we’re most concerned about in this plan: diesel PM, NO_x, ROG, and SO_x. Table D-1 shows the emissions of each pollutant over time, with the benefits of air pollution controls already adopted by ARB, U.S. EPA, and other agencies as of October 2005.

Table D-1
Statewide
Emissions from Ports and International Goods Movement
With Measures Adopted Through October 2005
(tons per day)

Pollutant	Year				
	2001	2005	2010	2015	2020
Diesel PM	15.3	17.8	19.5	22.5	27.7
NO _x	273	290	292	322	373
ROG	18	18	17	17	18
SO _x	63	84	107	137	181

The distinction between international goods movement, and all goods movement, significantly impacts our estimates of the emissions from trucks, trains, and cargo handling equipment. Emission estimates for marine vessels and harbor craft are not affected, as those categories are included in their entirety in both the “all” goods movement and “international” goods movement inventories.

Table D-2 summarizes statewide emissions from ports and international goods movement by sector with measures adopted through October 2005.

Table D-2
Statewide
Emissions from Ports and International Goods Movement By Sector
with Measures Adopted Through October 2005
(tons per day)

Sector	Year				
	2001	2005	2010	2015	2020
Diesel PM					
Ships	7.8	10.6	13.8	17.8	23.3
Harbor Craft	3.8	3.7	2.9	2.1	1.8
Cargo Handling Equipment	0.8	0.7	0.5	0.3	0.2
Trucks	1.6	1.3	0.8	0.7	0.5
Transport Refrigeration Units	0.1	0.1	0.1	0	0
Locomotives	1.2	1.4	1.4	1.6	1.9
Total	15.3	17.8	19.5	22.5	27.7
NOx					
Ships	94.7	124.9	158.2	199.6	253.6
Harbor Craft	75.4	69.2	56.4	43.6	38.6
Cargo Handling Equipment	20.5	18.4	15.7	11	6.1
Trucks	31.3	32.9	25.7	23.9	21.1
Transport Refrigeration Units	0.6	0.7	0.8	0.9	0.9
Locomotives	50.6	43.5	35.4	43	52.3
Total	273.1	289.6	292.2	322	372.6
ROG					
Ships	2.4	3.2	4.2	5.3	6.8
Harbor Craft	7.6	7	5.9	4.5	4
Cargo Handling Equipment	2.5	1.9	1.2	0.8	0.7
Trucks	2.3	2.2	1.7	1.7	1.7
Transport Refrigeration Units	0.4	0.3	0.2	0.1	0.1
Locomotives	3.1	3.3	3.7	4.3	5
Total	18.3	17.9	16.9	16.7	18.3
SOx					
Ships	59.6	81.1	106.1	136.9	180.4
Harbor Craft	0.4	0.4	0.1	0.1	0.1
Cargo Handling Equipment	<0.05	<0.05	0.1	0.1	<0.05
Trucks	0.2	0.2	0	0	0.1
Transport Refrigeration Units	<0.05	<0.05	<0.05	<0.05	<0.05
Locomotives	2.4	2.6	0.3	<0.05	0.1
Total	62.6	84.3	106.6	137.1	180.7

2. Emission Reductions from Plan Strategies

Table D-3 shows the emission reductions from ports and international goods movement that could be expected statewide from full implementation of the strategies discussed in this plan.

Table D-3
Statewide
Emission Reductions from Ports and International Goods Movement
with Full Implementation of Plan Strategies
(tons per day)

Pollutant		Year		
		2010	2015	2020
Diesel PM	Emissions with Existing Program*	19.5	22.5	27.7
	Reductions from New Strategies*	-6.6	-15.1	-20.5
	Emissions with Plan	12.9	7.4	7.2
	Percent Reduction in Same Year	34	67	74
NOx	Emissions with Existing Program	292.2	322	372.6
	Reductions from New Strategies	-49.4	-150.4	-245.4
	Emissions with Plan	242.8	171.6	127.2
	Percent Reduction in Same Year	17	47	66
ROG	Emissions with Existing Program	16.9	16.7	18.3
	Reductions from New Strategies	-1.6	-3.4	-6.0
	Emissions with Plan	15.3	13.3	12.3
	Percent Reduction in Same Year	9	20	33
SOx	Emissions with Existing Program	106.6	137.1	180.7
	Reductions from New Strategies	-65.3	-122.2	-165.3
	Emissions with Plan	41.3	14.9	15.4
	Percent Reduction in Same Year	61	89	91

* "Existing program" includes measures adopted as of October 2005. Rules adopted after that date or proposed approaches are considered "new strategies."

3. 2005 Health Impacts

Chapter I discusses the health impacts associated with all goods movement in California, and provides an overview of how we estimate the number of premature deaths and other health effects associated with air pollution. Appendix A provides a more detailed discussion of this methodology. Table D-4 shows the estimated numbers of key health outcomes caused by 2005 levels of emissions from ports and international goods movement sources. The estimate of premature deaths from ports and international goods movement in the draft plan was 750 cases per year in 2005; the current estimate decreased slightly to 660 cases because we refined and reduced our estimates of truck and rail trips associated with the international portion of goods movement.

Table D-4
Annual 2005 Statewide PM and Ozone Health Effects Associated
with Ports and International Goods Movement¹

Health Outcome	Cases per Year	Uncertainty Range²	Valuation (in millions)	Uncertainty Range³ (in millions)
Premature Death	660	190 to 1,100	\$5,200	\$1,600 to \$9,800
Hospital Admissions (respiratory causes)	490	290 to 680	\$16	\$10 to \$23
Hospital Admissions (cardiovascular causes)	240	150 to 370	\$10	\$6 to \$15
Asthma and Other Lower Respiratory Symptoms	17,000	6,600 to 27,000	\$0.3	\$0.1 to \$0.5
Acute Bronchitis	1,400	-340 to 3,000	\$0.6	-\$0.1 to \$1
Work Loss Days	100,000	89,000 to 120,000	\$19	\$16 to \$22
Minor Restricted Activity Days	1,000,000	600,000 to 1,400,000	\$60	\$36 to \$86
School Absence Days	270,000	110,000 to 430,000	\$24	\$10 to \$38
Total	Not applicable		\$5,300	\$1,700 to \$10,000

¹ Does not include the reduction in contributions from particle sulfate formed from SOx emissions, which is being evaluated with several ongoing emissions, measurement, and modeling studies.

² Range reflects uncertainty in health concentration-response functions, but not in emissions or exposure estimates. A negative value as a lower bound of the uncertainty range is not meant to imply that exposure to pollutants is beneficial; rather, it is a reflection of the adequacy of the data used to develop these uncertainty range estimates.

³ Range reflects statistically combined uncertainty in concentration-response functions and economic values, but not in emissions or exposure estimates.